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STATE DOCUMENTS

ESTIMATE OF PLANNING SURVEY EXPENDITURES

FOR PERIOD BEGINNING JANUARY 1, 1967

AND ENDING DECEMBER 31, 1967

MONTANA STATE HIGHWAY COMMISSION

IN COOPERATION WITH

U.S. DEPARTMENT OF COMMERCE

BUREAU OF PUBLIC ROADS

DATE RECD. P/W		FEB 21 1967	
Act	Info.	MAIL ROUTE	Initial
		60 Chief R/W Agent	
		61 Sr. Asst. Chief R/W Agent	
		62 Plan & Program	
		63 Appraisal	
		64 Negotiation	
		65 Utility	
		66 Land & Records	
2	1		
PLEASE FILE			
General File		Project	
Parcel		Utility	

Revised January 10, 1967

MONTANA STATE LIBRARY
930 East Lyndale Avenue
Helena, Montana 59601

Montana State Library



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ESTIMATE OF ACTIVITIES AND
EXPENDITURES OF PLANNING SURVEY SECTION
FOR PERIOD OF JANUARY 1, 1967 - DECEMBER 31, 1967
REVISED JANUARY 10, 1967

PART I PLANNING ACTIVITIES

1. ADMINISTRATION AND CONTROL

P-1 Undistributed Overhead

This category includes the cost of materials, supplies and other items that cannot be separately identified and charged to specific projects in this work program. It also includes a substantial part of the salaries of the Planning Survey Manager and the secretarial staff.

ESTIMATED EXPENDITURES \$25,000

P-2 Public Hearings

This item will cover the cost of assembling traffic and other data required to support and evaluate specific route locations for public hearings. It will also be used to cover the costs of preparing exhibits that may be used at these hearings.

ESTIMATED EXPENDITURES \$ 2,000

2. ROAD INVENTORY

P-3 Inventory and Field Checking of Maps

During 1966, the following ten counties were inventoried by field checking of maps compiled from aerial photography: Beaverhead, Blaine, Carbon, Flathead, Garfield, Glacier, Lake, Lincoln, Petroleum, and Sanders. The inventory of these counties completes the second inventory cycle for all counties that started in 1959.

During 1967 it is planned to reinventory the following ten counties: Cascade, Golden Valley, Judith Basin, Missoula, Musselshell, Pondera, Ravalli, Teton, Wheatland, and Yellowstone. These counties were last inventoried in 1959 and 1960. It is now planned to reinventory all counties, within the next six years.

ESTIMATED EXPENDITURES \$25,000



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P-4 Traveled Way Studies

The required field inventories of the Interstate present traveled way will be complete in 1966. It is planned to update the charts and coding during 1967 to reflect conditions as of December 31, 1966.

ESTIMATED EXPENDITURES \$ 3,000

P-5 Bridge Records for Defense Requirements

It is planned to make the regular biennial field inspection and inventory of all bridges on the Primary and Secondary systems during 1967. The regular Bridge Listing and the Bridge Listing for Defense Requirements will incorporate the revised data obtained from the inspection and inventory.

ESTIMATED EXPENDITURES \$ 7,500

P-6 Inventory & Inspection of Selected Bituminous Surfaces

It is planned to initiate a pilot project to inspect and inventory selected bituminous surfaces throughout the State to determine the condition of both sealed and unsealed sections in relation to cracking, raveling, etc.

A research project may be requested at a later date to make an in-depth inspection of certain sections of highway to determine the effects of seal coating on moisture content, etc.

ESTIMATED EXPENDITURES \$ 2,000

3. MAPPING:

Rural and General Mapping

P-7 County Maps

Complete remapping of Lewis and Clark County by conventional methods was finished in 1966. There are now five counties that have been completely remapped. In an effort to accelerate the remapping of the remaining counties, it is planned to initiate scribing and "stick up" lettering processes for county mapping during 1967. It is also planned to purchase recent aerial photography coverage for those counties that will be remapped next year. Highway and Transportation maps of all counties will be revised to reflect road construction changes and road inventory data will be added to those maps that were field checked during the year.

ESTIMATED EXPENDITURES \$24,000

P-8 State Maps

This category includes the cost of preparing the official State highway tourist map, State systems map, etc. A new highway and transportation State map was started during 1966 and should be complete in 1967. A State traffic flow map of the Primary and Secondary Systems will also be published during 1967.

ESTIMATED EXPENDITURES \$ 5,000

Urban Mapping

P-9 City Plats

It is planned to revise all city plats to reflect changes in corporate areas and to show new street construction. The City Plat book, containing plats of all incorporated cities in Montana, will be published during 1967.

ESTIMATED EXPENDITURES \$ 7,500

P-10 City Photography

Aerial photography was obtained for all cities over 5,000 population, during 1966. It may be considered necessary to obtain new photography on a few of our smaller cities, where extensive highway changes have occurred. These photographs will be included in the City Plat book.

ESTIMATED EXPENDITURES \$ 3,000

P-11 Community Photographs and Plats

Plats have been compiled and drafted for approximately 130 of the larger unincorporated communities in the State. It is planned to combine these plats with the corresponding aerial photos and publish a community plat book similar to the one now being published for incorporated cities.

ESTIMATED EXPENDITURES \$ 2,000

4. TRAFFIC

Volume Counts

P-12 Regular Traffic Counts

This is a continuing traffic counting program that has been in effect for many years. Machine counts of at least 48 hour duration

are taken seasonally on Primary and Secondary highways, principal county roads and some city streets. It is also planned to initiate a program of blanket counting during 1967. The results of these counts are used in preparing the annual Traffic By Section report, Traffic Flow Maps and for supplying various types of information for highway design and public inquiries. Four men follow a prepared schedule and one extra man is available for special counts as required.

ESTIMATED EXPENDITURES \$50,000

P-13 Automatic Traffic Counters

The replacement of the Photo-Electric cell machine on the PTW of I-15 near Wolf Creek was not done during 1966, due to incomplete construction on the new alignment. It is now planned to make this replacement during 1967.

It is also planned to install an automatic counter on I-90 between Livingston and Big Timber, in order to establish the traffic patterns on the section of highway between Butte and Billings.

Approximately \$2,500 will be required for the purchase of new equipment. The remainder of the estimated expenditure will be used for installation of the new machines and the maintenance of existing counters.

ESTIMATED EXPENDITURES \$22,000

P-14 Portable Traffic Counters

It is planned to replace 10 portable counters during 1967 that have been stolen, damaged by vandals, or are worn out beyond repair. Total cost of these 10 counters will be about \$4,000. The remaining estimated expenditure will be used for repairs and servicing of existing counters.

ESTIMATED EXPENDITURES \$ 8,000

Vehicle Classification and Occupancy

P-15 Vehicle Classification Counts

Classification counts will be taken for eight hours four times seasonally during 1967 at about 150 major intersections on the Interstate, Primary, and Secondary highways. It is planned to continue to take these counts during the hours of 6 a.m. to 10 p.m. They will be taken on schedule in conjunction with our regular Volume Counting programs.

It is also planned to classify traffic for one eight-hour period seasonally on major highways crossing county lines. Montana

vehicles would be classified by the license prefix designating the county of registration. Trucks and out-of-state vehicles would be classified in the usual manner. This study was made in 1959 and the results have been used quite extensively.

ESTIMATED EXPENDITURES \$35,000

Vehicle Weight and Characteristics

P-16 Loadometer

This is a continuing study that has been conducted each year during the month of August to determine truck loading trends and other characteristics of commercial vehicles.

Trucks will be weighed, as usual, at 12 rural and 2 urban locations, on the Primary and Interstate Systems during the hours of 6 a.m. to 10 p.m. Twenty-four hour classification counts will be taken at all stations.

It is also planned to establish 10 new stations to weigh trucks on some of the more important secondary highways. Weighing will be done on a schedule similar to the one established for stations on the Primary and Interstate System. The results will be combined with data from the regular locations and published in one annual report.

This category also includes the cost of installing necessary research weighing facilities at approved sites on the Interstate System. It is estimated that two dual research facilities will be installed during 1967 at a cost of \$25,000 each.

ESTIMATED EXPENDITURES \$65,000

Design Hour Volumes

P-17 Design Hour Volumes

Design hour traffic volumes have been tabulated for each permanent traffic counter for a number of years. It is planned to compile these historical and current data for each location and publish an annual report.

ESTIMATED EXPENDITURES \$ 1,000

Origin and Destination Studies - Rural

P-18 Rural Origin and Destination Studies

This category includes the cost of small origin and destination studies that may be necessary in connection with interchange

locations or minor relocations on Federal-aid routes. No major rural origin and destination studies are planned for 1967.

ESTIMATED EXPENDITURES \$ 3,000

Special Traffic Studies

P-19 Special Traffic Counts

This category covers special traffic counts of various types which are not included in other projects. It includes special turning movement counts taken at urban intersections for signal justification, counts on roads intersecting Interstate highways, as well as other special situations which arise during the year.

ESTIMATED EXPENDITURES \$10,000

P-20 System Volume and Classification Counts

This special study was designed to furnish vehicle miles of travel by road system and vehicle type. Actual field work started April 1, 1965 and terminated March 31, 1966. The analyses of the data are almost complete but it is anticipated there will be a small carry over of charges to 1967.

ESTIMATED EXPENDITURES \$ 500

5. HIGHWAY STATISTICS

Mileage

P-21 Road Log, State Mileage and Local Mileage Tables

These are continuing studies which maintain a record of highway construction and maintenance on all road systems in the State. Annual reports are published showing the status of each system at the end of each calendar year.

The Road Log reports the current status of all construction on state systems by route and project. This report also contains summary mileage tables by such items as surface width and type, project class, year of construction and location by city, county, and reservation.

The State Mileage Tables report the status of each Federal-aid System at the beginning of the year, the changes that have taken place during the year and finally the status of each system at the close of the calendar year.

The Local Mileage Tables are very similar to the State Mileage Tables except that local mileage that is not on any state system

is reported. Data for these tables are obtained by actual field inventory of local roads and by personal contact with officials of various road building agencies throughout the State.

ESTIMATED EXPENDITURES \$26,000

Motor Vehicles, Operators and Fuels

P-22 Statistical Reports

Statistical reports on motor vehicle registrations and fuel consumption will be reported as usual on a monthly and annual basis. Statistics on all motor vehicle operators will be reported annually.

ESTIMATED EXPENDITURES \$ 3,000

P-23 Truck and Bus Statistics

This is a cooperative project that has been carried on with the Gross Vehicle Weight Section. Data from truck registration certificates are transferred to IBM cards for processing. Data on the number and type of trucks registered by G.V.W. class are obtained from this activity for reports used at the State and National level. Costs are prorated between the Planning Survey and Gross Vehicle Weight Sections in proportion to the number of columns on the IBM card that are utilized for the two functions.

ESTIMATED EXPENDITURES \$ 6,000

FINANCE

P-24 Financial Statistics

Annual reports covering financial statistics for all road building agencies in Montana will be compiled and published as usual.

ESTIMATED EXPENDITURES \$ 5,000

6. ECONOMIC AND FISCAL

P-25 Motor Vehicle Use Study

This special study was started in 1963 and is now nearing completion. The final report should be published in February of 1967. This item should cover the cost incurred during 1967.

ESTIMATED EXPENDITURES \$ 500

P-26 Highway Investment and Road Life

This project is a continuing study which maintains an historical record of highway construction and maintenance. It also furnishes a record of highway investment and service life. It is planned to update the RL-3 and RL-11 Tables, which were last produced in 1959.

ESTIMATED EXPENDITURES \$ 4,000

P-27 Straight Line Diagrams

These diagrams present an historical record of highway construction and other major features for all projects on the Federal-aid systems. They are revised annually to reflect any changes due to construction projects or maintenance betterments. Some of the older diagrams have been completely revised during 1966. It is planned to continue revising older drawings until all of them have been redrawn.

ESTIMATED EXPENDITURES \$13,000

Construction Cost Data and Cost Indexes

P-28 Construction Statistics

The activities covered by this item include analyses of unit construction costs by work items and quantities of material on all highway and bridge projects constructed by or under the supervision of the State Highway Department. The results are used to compile the semiannual construction price index and the annual report of construction costs and mileage by type of construction, rural or municipal status and location by county and financial district.

ESTIMATED EXPENDITURES \$ 2,500

Economic Highway Studies

P-29 Economic Impact Study, One-Way Couplet, Helena

This study was approved June 14, 1966 as supplementary Item P-46 of HPR-1(4). It is being conducted by Carroll College of Helena to evaluate the effect that the one-way couplet has had on the development of the adjacent area, in terms of commercial development, land values, traffic growth, etc. The study should be complete about April 30, 1967.

ESTIMATED EXPENDITURES \$ 2,300

P-30 Route Feasibility Studies

This is a contingency item for any study of this type that may develop during 1967. It will cover the cost of economic studies of proposed routes on the Primary and Secondary Systems, to determine which alternate will produce maximum benefits to the highway user at minimum costs. Economic studies of alternate routes on the Interstate System are now being done, when required, as a preliminary engineering function.

ESTIMATED EXPENDITURES \$ 2,000

P-31 Swan Valley Highway Economic Study

The effects that Secondary Highway 209 has had upon the local economy of the Swan River-Clearwater Valleys is being studied by the University of Montana's Bureau of Business and Economic Research. This study started about June 15, 1966 and is scheduled for completion by September 30, 1967.

ESTIMATED EXPENDITURES \$ 9,000

P-32 Traffic Corridor Economic Study

This study covers the economic effects that the construction of Interstate 90 will have in the Gallatin Valley, between Three Forks and Bozeman. It will be conducted in two phases.

Phase I, which is being conducted by the University of Montana's Bureau of Business and Economic Research, covers the study of economic conditions in the Gallatin Valley prior to the opening of I-90. It will involve an inventory of businesses, employment, gross receipts, gasoline sales, electrical consumption, telephone and electrical hookups, and traffic patterns. Phase I is scheduled for completion by September 30, 1967.

It is planned to study these same economic factors in Phase II of the study, which will not be scheduled until traffic patterns have stabilized in the Gallatin Valley.

ESTIMATED EXPENDITURES \$ 4,000

P-33 Right-of-Way Studies

This has been a continuing study of the before and after values of parcels of land remaining after portions of the land have been acquired for right-of-way purposes. It is planned to limit the scope of this project during 1967 to cases already under study.

ESTIMATED EXPENDITURES \$ 1,000

P-34 Continuing Highway Needs Estimate

During 1966, a highway needs estimate was made on the Primary System, exclusive of Interstate mileage. It is planned to review and revise this estimate periodically in order to keep it current. It is also planned to conduct a pilot study to estimate costs and establish priorities on the Secondary System.

ESTIMATED EXPENDITURES \$10,000

P-35 Sufficiency Ratings

A sufficiency rating of the Primary System was made during 1966. This rating system has been used to allocate construction funds to Montana's 12 financial districts and to develop construction priorities for the Primary System Needs Estimate.

Further work will be done to determine the feasibility of using the sufficiency rating to program construction projects by financial districts.

It is planned that this will be a continuing study that will require updating each year.

ESTIMATED EXPENDITURES \$17,000

8. URBAN TRANSPORTATION STUDIES

General

Under the continuing urban planning process it is necessary to update both the Billings and Great Falls Transportation studies at approximately five year intervals.

The updating of the Billings study has been contracted to a consulting firm as of August 1966 and a completion date of August 1968 is anticipated.

The Missoula study, which is also being done by consultants, should be complete by December 1, 1967.

The final report on the 1961 Great Falls Urban Transportation Study was finished and presented to the city in December of 1965. Because this report is only a little more than one year old, it has been decided to postpone the updating of the Great Falls Study until the summer of 1968.

The following estimated costs are anticipated for the Missoula and Billings Transportation Studies.

P-36 Billings Five Year Review \$75,000
P-37 Missoula Comprehensive Study \$36,000

ESTIMATED EXPENDITURES \$111,000

P-38 City Planning General

This item will cover the cost of minor planning studies in cities which are not included in major urban transportation surveys.

ESTIMATED EXPENDITURES \$ 5,000

9. SPEED AND TRAFFIC SERVICE STUDIES

P-39 Speed Studies -- Regular

Speed studies have been made each year on selected sections of highway to determine current speeds by vehicle type and to establish trends. The results of these studies are also used for safety purposes and for highway design. It is planned that this work will continue in the usual manner.

ESTIMATED EXPENDITURES \$ 1,000

P-40 Speed Studies -- Special

It is planned to make additional speed studies throughout the State during 1967 in connection with establishing rural speed zones on F 9999 projects and through urban communities. This work will probably be done by the Traffic Engineer's Office.

ESTIMATED EXPENDITURES \$ 2,000

P-41 Accident Studies -- Regular

This project is a continuing study involving the review of all accident reports and their identification by type of accident and location. Spot accident maps are prepared and an annual report is compiled which compares accident rates by section on the Primary and Interstate Systems.

During 1966, a statistical analysis was made of the accident rates on each section of rural Primary and Interstate Highway, to determine whether the computed accident rates were actually significant or if it was possible that the accidents occurred by chance. It is planned to do some additional investigation of those accidents occurring on sections of highway where the rates appear to be significant. This investigation will be made in cooperation with the Traffic Engineering Section.

Accident files, compiled under this study, are also used to

identify high accident frequency locations and in Phase I and II of the interstate Accident Studies.

Mileposts will be installed on the Primary, Interstate, and State Maintained Secondary Systems, during 1966. This will facilitate accident reporting during 1967 and will probably require major changes in the filing system. The format of the 1967 annual report will also be changed to incorporate milepost location data.

ESTIMATED EXPENDITURES \$15,000

P-42 Mile Post System

Mileposts are being installed on the Primary, Interstate, and State Maintained Secondary Systems. It was anticipated that the fieldwork by maintenance forces would be complete during 1966 but due to accounting procedures there may be some carryover of charges into 1967. This item will cover these charges.

ESTIMATED EXPENDITURES \$ 2,000

10. REFERENCE LIBRARY

P-43 Highway Library

A central highway library was established as a continuing project during 1964. It has been operating very satisfactorily and has been of great value in providing ready references on subjects pertaining to various phases of highway planning, construction, and operation. A part time employee has been added to the librarian's staff. It is planned to continue this project through 1967.

ESTIMATED EXPENDITURES \$ 8,200

11. SPECIAL STUDIES

P-44 Anticipated Special Studies -- General

This item covers the cost of anticipated special studies that may be requested to provide answers to specific questions posed by Congress, the State Legislature, or the Montana Highway Commission. These studies are usually a one-time operation and their scope can vary widely from a simple request of a tabulation of data already on file to an extended study involving a considerable amount of special fieldwork.

ESTIMATED EXPENDITURES \$10,000

P-45 Interstate Cost Estimate

It is anticipated that a complete cost estimate of the remaining construction on the Interstate System will be required by Congress for the 1968 Session. In view of the additional four-lane construction that is now required by law in Montana, the 1968 estimate will probably be more difficult and time consuming than those made previously.

ESTIMATED EXPENDITURES \$35,000

SUMMARY OF PLANNING ACTIVITIES -- PART I
FOR PROJECT HPR-1(5) CALENDAR YEAR 1967
REVISED JANUARY 10, 1967

ITEM NO.	<u>PROJECT NAME</u>	<u>ESTIMATED COST</u>
		\$
P- 1	Undistributed Overhead	25,000
P- 2	Public Hearings	2,000
P- 3	Inventory and Field Checking of Maps	25,000
P- 4	Traveled Way Studies	3,000
P- 5	Bridge Records for Defense Requirements	7,500
P- 6	Inventory & Inspection of Slected Bituminous Surfaces	2,000
P- 7	County Maps	24,000
P- 8	State Maps	5,000
P- 9	City Plats	7,500
P-10	City Photography	3,000
P-11	Community Photographs and Plats	2,000
P-12	Regular Traffic Counts	50,000
P-13	Automatic Traffic Counters	22,000
P-14	Portable Traffic Counters	8,000
P-15	Vehicle Classification Counts	35,000
P-16	Loadometer	65,000
P-17	Design Hour Volumes	1,000
P-18	Rural Origin and Destination Studies	3,000
P-19	Special Traffic Counts	10,000
P-20	System Volume and Classification Counts	500
P-21	Road Log, State Mileage and Local Mileage Tables	26,000
P-22	Statistical Reports	3,000
P-23	Truck and Bus Statistics	6,000
P-24	Financial Statistics	5,000
P-25	Motor Vehicle Use Study	500
P-26	Highway Investment and Road Life	4,000
P-27	Straight Line Diagrams	13,000
P-28	Construction Statistics	2,500
P-29	Economic Impact Study, One-Way Couplet--Helena	2,300
P-30	Route Feasibility Studies	2,000
P-31	Swan Valley Economic Study	9,000
P-32	Traffic Corridor Economic Study	4,000
P-33	Right-of-Way Studies	1,000
P-34	Continuing Highway Needs Estimate	10,000
P-35	Sufficiency Ratings	17,000
P-36	Billings Five Year Review	75,000
P-37	Missoula Comprehensive Study	36,000
P-38	City Planning General	5,000
P-39	Speed Studies Regular	1,000
P-40	Speed Studies Special	2,000
P-41	Accident Studies Regular	15,000
P-42	Mile Post System	2,000
P-43	Highway Library	8,200
P-44	Anticipated Special Studies General	10,000
P-45	Interstate Cost Estimate	<u>35,000</u>
TOTAL PLANNING ACTIVITIES -- PART I		\$595,000

PART II RESEARCH AND DEVELOPMENT ACTIVITIES

R-1 Interstate Accident Study Phase I -- P.S.

This is a continuing study involving the comparison of traffic accident data on the Interstate System before and after construction. It is planned to include additional sections of constructed Interstate in this study as they are complete and opened to traffic.

ESTIMATED EXPENDITURES \$ 4,500

R-2 Interstate Accident Study Phase II -- T. E.

This has been a continuing as well as a companion study to Item R-1. In this phase an attempt is made to relate the causes of traffic accidents on constructed sections of the Interstate System to geometric design features and speed.

It is proposed to continue to analyse accidents on the study sections during 1967 but the traffic counting and speed studies will be curtailed.

ESTIMATED EXPENDITURES \$ 1,000

R-8 Evaluation of Mineral Fillers -- M.D.

This research was approved and started during 1966. It has been under the direction of the Materials Division but due to a shortage of trained personnel the completion date of July 31, 1966 was not met. It will, therefore, be necessary to continue the project until about July 1, 1967 in order to reach any conclusions.

Samples of typical aggregates have been assembled and some testing has been done on the effects of major types of mineral fillers now on the market.

ESTIMATED EXPENDITURES \$ 1,000

R-9 Landslide Investigation -- M.D.

This research has been a continuing project conducted by the Materials Division for the past 3 years. The research has been directed toward the location and investigation of known and potential landslides. During the past year an extensive investigation was carried out on the landslide south of Livingston.

It is planned to complete the investigation of the Livingston landslide during 1967 and to phase out landslide investigation as a research project.

ESTIMATED EXPENDITURES \$15,000

R-10 Drainage Area Flow Research -- U.S.G.S.

This is a continuing study which has been conducted for several years under the supervision of the U.S. Geological Survey. The objective is to provide data concerning the magnitude and frequency of floods on small drainage courses. The results of this study are used by our design department to determine the proper size of various drainage structures.

Several years of historical stream flow data have now been accumulated at several locations. It is, therefore, proposed to reduce the scope of this project during 1967 by eliminating those locations where adequate data are available.

ESTIMATED EXPENDITURES \$18,000

R-11 Drainage Correlation Research -- M.S.U.

This has been a continuing project since 1963 under the jurisdiction of Montana State University. It is designed to correlate stream flow from four drainage courses with such factors as precipitation, wind velocity, temperature, vegetative cover, soil types, etc. The original completion date was June 30, 1967.

It now appears that the records extending over a two and one-half year period do not have the desired statistical significance. It is, therefore, proposed to leave the instrumentation in place and continue the record keeping and analysis until 1970. A detailed prospectus on the proposed extension has been submitted.

ESTIMATED EXPENDITURES \$40,000

R-14 Large Culvert Research -- M.S.U.

This research began under the jurisdiction of M.S.U. as an investigation of erosion problems at the sites of large culverts and the hydraulic properties of such culverts. During 1965 approval was granted to conduct additional research into the factors contributing to the failure of a large culvert near Wolf Creek, Montana.

Phase I of this project, covering the investigation of erosion problems at the sites of large culverts, is complete except for the writing of the final report. It is now expected that the final report on this phase will be submitted for approval about January 1, 1967.

Phase II the gathering of data on the instrumented large culvert in Wolf Creek Canyon, is continuing on schedule. This phase should terminate with the submission of the final report about September 30, 1967.

ESTIMATED EXPENDITURES \$12,400

R-15 Roadside Reseeding Research -- M.S.U.

This item is a continuation of an approved research project under the jurisdiction of the Agricultural Experiment Station of Montana State University at Bozeman. The project involves investigation of grasses and other vegetative cover that is adaptable to climatic conditions and soil types encountered in highway construction in Montana. The objectives are to prepare recommendations concerning the type of vegetation to be seeded, the type of machinery necessary for the application and to develop application specifications. It is planned to seed additional test plots in 1967 and continue to design or redesign pilot models of special machinery necessary for seeding operations.

ESTIMATED EXPENDITURES \$30,000

R-17 Lithified Shales Research -- M.T.

This continuing project, under the supervision of the Montana School of Mineral Science and Technology, consists of an investigation of the swelling properties of lithified shales which are prevalent in eastern Montana. The objective is to determine the effects of moisture and load removal on shale expansion.

ESTIMATED EXPENDITURES \$10,000

R-19 Subscription to Highway Research Correlation Service

This item covers the cost of a subscription to the Highway Research Correlation Service.

ESTIMATED EXPENDITURES \$11,500

R-20 Aggregate Asphalt Adhesion By Heats of Immersion -- M.T.

This research was approved as a supplementary item, R-20, in the 1966 work program. It is under the supervision of the Montana School of Mineral Science and Technology.

Phase I, of this project, was designed to investigate the mechanisms of interaction between bituminous and mineral aggregate systems by means of the measurement of heats of immersion. This phase is scheduled for completion about July 1, 1967.

If the heats of immersion of aggregate-asphalt systems can be measured in a practicable manner, it is proposed to initiate Phase II of this project.

Phase II will cover the comparison of infra-red spectra and heats of immersion of aggregates and the conditions of optimum bonding between various types of aggregates and asphalt cement.

The successful completion of Phase I will determine whether Phase II will be initiated. A detailed prospectus of both phases has been submitted.

ESTIMATED EXPENDITURES \$12,000

R-22 Correlation of Agricultural Land Value Factors -- M.S.U.

This study involves the investigation of the use of feed and live-stock production as a common unit of comparison in correlating farm and ranch sales. The project is designed to study and correlate the major factors influencing farm and ranch values. The major emphasis will be on the market data approach to value and common factors affecting sales.

If successful, a study of this type could add materially to the knowledge and techniques of field and reviewing right-of-way appraisers. The project will be under the direction of the Department of Agricultural Economics at Montana State University. A detailed prospectus has been submitted and approved.

ESTIMATED EXPENDITURES \$ 8,500

R-23 Undistributed Overhead

This item is proposed to cover the cost of general supervision of all research projects included in this work program.

ESTIMATED EXPENDITURES \$10,000

SUMMARY OF RESEARCH AND DEVELOPMENT ACTIVITIES--PART II
FOR PROJECT HPR-1(5) CALENDAR YEAR 1967
REVISED JANUARY 10, 1967

ITEM NO.	<u>PROJECT NAME</u>	ESTIMATED COST \$
R- 1	Interstate Accident Study--Phase I--PS	4,500
R- 2	Interstate Accident Study--Phase II--TE	1,000
R- 8	Evaluation of Mineral Fillers--MD	1,000
R- 9	Landslide Investigation--MD	15,000
R-10	Drainage Area Flow Research--USGS	18,000
R-11	Drainage Correlation Research--MSU	40,000
R-14	Large Culvert Research--MSU	12,400
R-15	Roadside Reseeding--MSU	30,000
R-17	Lithified Shales Research--MT	10,000
R-19	Subscription to Highway Research Correlation	11,500
R-20	Aggregate-Asphalt Adhesion by Heats of Immersion--MT	12,000
R-22	Correlation of Agricultural Land Values--MSU	8,500
R-23	Undistributed Overhead	<u>10,000</u>
TOTAL OF RESEARCH AND DEVELOPMENT ACTIVITIES--PART II		173,900
TOTAL OF PLANNING ACTIVITIES--PART I		<u>595,000</u>
GRAND TOTAL		\$768,900

CODE:

MSU	Montana State University	TE	Traffic Engineer
RWD	Right Of Way Division	MD	Materials Division
MT	Montana School of Mineral Science and Technology	PS	Planning Survey
		USGS	U.S. Geological Survey

TECHNICAL RESPONSIBILITY FOR MONITORING

STUDY NUMBER		TITLE OF STUDY	ESTIMATED COST 1967 \$	TECHNICAL RESPONSIBILITY FOR MONITORING
BFR	STATE			
Continuing Studies				
R-1		Interstate Accident Study--Phase I	4,500	
R-2		Interstate Accident Study- Phase II	1,000	
R-8		Evaluation of Mineral Fillers--MD	1,000	
R-9		Landslide Investigation--MD	15,000	
R-10		Drainage Area Flow Research--USGS	18,000	
R-11		Drainage Correlation Research--MSU	40,000	
R-14		Large Culvert Research--MSU	12,400	
R-15		Roadside Reseeding--MSU	30,000	
R-17		Lithified Shales Research--MT	10,000	
R-19		Subscription to Highway Research Correlation	11,500	
R-20		Aggregate-Asphalt Adhesion by Heats of Immersion--MT	12,000	
R-22		Correlation of Agricultural Land Values--MSU	8,500	
R-23		Undistributed Overhead	<u>10,000</u>	
TOTAL -- Continuing Studies			\$173,900	

